

MANGO AGRIBUSINESS DEVELOPMENT STRATEGY FOR SUSTAINABLE AGRICULTURE IN KARANGANYAR

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Abstract:

An agrarian country prioritizes the agricultural sector as its resource because it provides a high and influential contribution to the community, Indonesia is one of the countries that have abundant natural resources and its economy depends on the agricultural sector. One of the industries that have the potential to be developed in the plantation sector and can be an aspect of sustainable agriculture is the mango fruit industry. Karanganyar Regency has a great opportunity to develop mango agribusiness considering the vast supply of land that has the potential to be planted with mangoes. The purpose of this study is to find out internal and external factors and then analyze network factors affecting the production of mangoes in Karanganyar Regency to provide recommendations with SWOT analysis and Grand Strategy matrix, and the priorities for strategies using the Analytic Network Process. Informants are considered the most competent (expert). Based on the calculation of the IFE and EFE scores, the quadrant I position (1.44; 1.18) was obtained, where the position was strategic for S-O. There are 4 alternative strategies in quadrant I S-O. Priority alternative strategies obtained by in-depth interviews with experts is Expanding Market Reach (0.393030). Expanding market reach is key to achieving competitive advantage and success in a farming business. Having an official distributor for each province is an alternative strategy that aims at the long term, with this strategy the company will make contact with the distributor chosen so that it can help the distribution of the company's products periodically.

Keywords: Sustainable Agriculture, Analytic Network Process, Mango

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INTRODUCTION

Indonesia is a country that has abundant natural resources and its economy depends on the agricultural sector, so it is known as an agricultural country. An agrarian country prioritizes the agricultural sector as its resource because it provides a high and influential contribution to the community. The agricultural sector is considered very promising if it is supported by fertile land and soil. Most of the Indonesian population living in rural areas live to farm and play an important role in the national economy.

Sutawi (2002) states that agribusiness is a unit of business activities that includes one or all of the chains of production, processing of products, and marketing that have to do with agriculture in a broad sense. The mobilization of the agribusiness sector requires the cooperation of various related parties, namely the government, the private sector, farmers, and banks so that this sector can contribute to the country's foreign exchange. Policies in terms of increasing investment must be supported by a conducive investment climate, including bureaucracy, access to credit, as well as a review of tax regulations and tax rates for the agribusiness sector (Gumbira et al, 2005).

One of the industries that have the potential to be developed in the plantation sector is the mango fruit industry, which is a processed form of food or beverages derived from the basic ingredients of mango fruit. Mango is grown commercially across the globe due to its nutritious value and market potential. The management orientation of the commercial mango growers was directly

and indirectly affecting production and quality of mango. Therefore, management of mango orchard on commercial basis required effective farm management skills, plan, supervision and controlling, etc (Dhenge et al, 2021). In general, mango fruit is in great demand in some circles for typical souvenirs and trading business production. Mango agribusiness has great prospects if it is well developed. Indonesia has a great opportunity to develop mango agribusiness considering the vast supply of land that has the potential to be planted with mangoes, favorable climatic conditions, and the availability of employment opportunities. According to data from the Central Statistics Agency of Central Java (BPS Jawa Tengah 2021), mango fruit is ranked second according to its production level after bananas. The biggest increase occurred in 2021, where growth was 8.3% from the previous year. This makes mangoes have great potential to be developed.

According to Fiesca's research (2022), around 50-60 percent of Indonesia's population or people live in rural areas. Furthermore, about 70 - 80 percent of this community group includes the poor with traditional and subsystem agriculture, fisheries, and forestry businesses. The condition of farmers in the Karanganyar Regency generally has low incomes. The production of mango farmers in the Karanganyar Regency is not stable. In many cases, mango farmers in Karanganyar Regency are often affected by plant diseases in their fields, resulting in large losses. However, mango prices often fluctuate so the selling price of farmers is unstable, causing losses. This situation can affect the income of mango farmers. As with other fruit commodities, the fluctuations in the selling price of mangoes are very high and it is difficult to predict accurately. The price fluctuations make farmers' selling prices unstable, so it becomes a concern for mango farmers because fluctuating price changes can affect their income. Agustian et al (2003), state uncertainty in the selling price of crops causes farmers to hesitate to implement intensive mango cultivation through increased input farm inputs as recommended.

The current condition of agriculture in Indonesia is a lot of modern agricultural practices, it can have an impact on environmental pollution that can damage soil fertility. The influence of excessive use of fertilizers and pesticides in addition to causing damage to the environment, the necessary maintenance costs are also quite large. This became the idea of developing sustainable agriculture. Sustainable agricultural development aims to increase the income and welfare of the farming community at large through increasing agricultural production which is carried out in a balanced manner by taking into account the carrying capacity of the ecosystem so that production sustainability can be maintained in the long term by minimizing the occurrence of environmental damage (Fadlina et al, 2013).

People who work as farmers are very dependent on their production, therefore a strategy is needed to improve the welfare of mango agribusiness farmers in Karanganyar Regency. The activities of farming and processing mangoes are carried out to get capital back, for further planting. As an agricultural country at the beginning of 2019, at least 38.1 million people were working in the agricultural sector, or more than twice the number working in the manufacturing industry (Heriqbaldi & Dwindi 2019).

Table 1. Annual production of fruits and vegetables by plant type in Central Java Province, 2018 – 2021

Kind of Plant	Year (kw/qui)			
	2018	2019	2020	2021
Avocado	11.624	13.362	16.709	80.738
Banana	115.331	120.125	144.036	108.038
Breadfruit	11.305	12.346	10.235	7.956
Duku	6.190	3.382	14.864	9.430
Durian	46.555	39.080	58.449	88.865
Gnetum/Melinjo	17.436	10.875	18.009	18.236
Guava	19.435	12.239	12.128	17.656
Jackfruit	103.372	148.193	145.369	85.324
Jengkol	3.981	2.977	3.397	4.102
Mango	84.292	123.167	263.583	93.503

Mangosteen	5.716	1.448	1.906	2.114
Orange/Tangerine	1.754	4.240	4.099	18.531
Papaya	9.730	6.820	7.241	12.003
Pinapple	75	101	89	176
Pomelo	527	365	1.275	3.333
Rambutan	62.376	58.196	134.211	71.781
Sapodilla/Sawo	4.059	3.378	4.528	7.134
Snakefruit	3.820	1.581	1.345	4.103
Soursop	1.181	1.048	1.080	1.521
Starfruit	1.373	1.677	1.263	2.032
Twisted Cluster Bean	26.361	23.985	21.555	39.563
Water Apple	3.515	3.355	4.251	4.887

Source: Central Java BPS 2022

One industry that has the potential to be developed in the horticulture sector is the mango fruit industry. According to Rachmah et al (2019), in terms of sustainability, mango production has contributed enough to the welfare of farmers and increased farmers access to capital. Karanganyar Regency has a great opportunity to develop mango agribusiness considering the large supply of land that has the potential to be planted with mangoes, favorable climatic conditions, and the availability of employment opportunities. Table 1 shows that mango production in Karanganyar Regency is 93.503 qui, where mango production is quite high, considering that after harvesting mangoes have an off-season period (Zainuri et al., 2019).

The decline in production from 2020 to 2021 is the reason for this research. The purpose of this study is to find out internal and external factors and then analyze network factors affecting the production of mangoes in karaganyar district to provide recommendations and priorities for strategies with SWOT analysis, grand strategy matrix, and the Analytic Network Process to develop sustainable agriculture.

METHODS

The method used is descriptive-analytic. Informants are people who come from research locations who are considered the most competent and willing to be used as a source of information, cooperate, discuss the results of research and provide clues, so that the information obtained is more in-depth (Kasiram, 2010). Informants are determined using judgment sampling techniques. An expert is a person who is considered to know the most about the object of study. The informants in this study were from the Department of Agriculture in Karanganyar Regency which consisted of the Head of Horticulture and Food Crops, the Head of Horticultural Production, and the Head of Processing and Marketing Section. The interview method is used directly through in-depth interviews with each informant to produce accurate data. The interview results that have been obtained are then determined the strengths, weaknesses, opportunities, and threats that exist in the Karanganyar Regency in the development of mango agribusiness. Data acquisition was carried out by analyzing by conducting interviews based on questionnaires that were distributed to respondents who had been selected as key informants and through direct observation in the field (Rahmadika et al, 2022). Formulation of alternative strategies with the SWOT method, then proceeds to determine the quadrant with a grand strategy matrix to determine the alternative strategy to be chosen (Patrisia et al, 2020). The formulation of the strategy was processed using Analytic Network Process, by looking at the priorities. Analytic Network Process is a general theory of relative measurement used to derive composite priority ratios from individual ratio scales reflecting relative measurements of the influence of interacting elements concerning control criteria (Saaty in Chen et al., 2019). Ascarya et al (2005) state in a network, elements in a component or cluster can be a person. Elements in a component or cluster can affect other elements in the same component or cluster (inner dependence), and can also affect elements in another cluster (outer dependence) by paying attention to each desired criterion in an Analytic Network Process to find out the overall influence of all elements.

The result of the Analytic Network Process method is obtained from the calculation of the super decision application 3.2.0. Rater agreement analysis is a measure that shows the level of conformity (approval) of the respondents. ANP framework structure was obtained from the agreement with the experts.

RESULT AND DISCUSSION

Formulation of strategy using SWOT analysis and then proceed with the grand strategy starting with identifying internal and external factors (Fikri dan Putra, 2022). This identification is carried out to determine what factors are the strengths and weaknesses as well as the opportunities and threats that exist in Karanganyar Regency to develop mango agribusiness. The results of the identification of internal and external factors state that internal factors have 5 aspects of strength and 5 aspects of weakness, as well as external factors that have 5 aspects of opportunities and 5 aspects of threats.

After identifying the internal and external factors of mango agribusiness in Karanganyar Regency, the next step is to formulate IFE with strengths and weaknesses (Handayani et al., 2022), which are presented in table 2 and table 3:

Table 2. External Factors

Opportunity	
1	High market demand for mangoes.
2	The climate and soil in Karanganyar are suitable for mango cultivation.
3	The existence of technology for post-harvest management.
4	Mango management into another product.
5	Buyers have easy access to mangoes.
Threats	
1	Attack of Plant Pest Organisms and the influence of the weather.
2	Mango is an annual plant that bears fruit at a certain time.
3	Requires capital and counseling from relevant agencies for the development of post-harvest handling.
4	Mango prices fluctuate. And there is no guarantee of price.
5	Farmers' profits are not optimal due to less extensive access to buyers. so most farmers sell mangoes to middlemen.

Table 3. Internal Factors

Internal and External Factors	
Strengths	
1	Availability of production facilities. production equipment and machinery. fertilizer. pesticide. seeds and seed availability.
2	Competitive price and quality of mango
3	With product diversification, it can expand market segmentation because consumer tastes vary
4	Capital assistance by government institutions that are useful for the development of farming
5	Information expansion for marketing access and auction market development
Weakness	
1	Production facilities are not sufficient.
2	Farmers' abilities and knowledge regarding mango handling and technological developments are still lacking
3	Product diversification is less attractive and prices are less competitive.
4	Institutional farmers are less active and selective in providing capital.
5	Auction market facilities are still very lacking

EFE Matrix. External strategy factors consist of opportunities and threats. The results of the calculation of the EFE Matrix are shown in table 4:

Table 4. EFE Matrix (External Factor Evaluation)

External Strategy Factors	Weight	Rating	Score
Opportunity			
1. Availability of production facilities. production equipment and machinery. fertilizer. pesticide. seeds and seed availability.	0.11	4	0.43
2. Competitive price and quality of mango	0.11	4	0.45
3. With product diversification, it can expand market segmentation because consumer tastes vary	0.10	4	0.41
4. Capital assistance by government institutions that are useful for the development of farming	0.11	4	0.43
5. Information expansion for marketing access and auction market development	0.10	4	0.38
Total Score			1.81
Threats			
1. Attack of Plant Pest Organisms and the influence of the weather.	0.10	1	0.10
2. Mango is an annual plant that bears fruit at a certain time.	0.11	1	0.11
3. Requires capital and counseling from relevant agencies for the development of post-harvest handling.	0.11	2	0.21
4. Mango prices fluctuate. And there is no guarantee of price.	0.11	1	0.11
5. Farmers' profits are not optimal due to less extensive access to buyers. so most farmers sell mangoes to middlemen.	0.10	1	0.10
Total Score			0.63
Grand Total			2.44

IFE Matrix. After identifying the internal and external factors of mango agribusiness in Karanganyar Regency, the next step is to formulate IFE with strengths and weaknesses, which are presented in table 5:

Table 5. IFE Matrix (Internal Factor Evaluation)

Internal Strategy Factor	Weight	Rating	Score
Strengths			
1. Availability of production facilities. production equipment and machinery. fertilizer. pesticide. seeds and seed availability.	0.09	4	0.35
2. Competitive price and quality of mango	0.10	4	0.40
3. With product diversification, it can expand market segmentation because consumer tastes vary	0.09	3	0.30
4. Capital assistance by government institutions that are useful for the development of farming	0.09	4	0.33
5. Information expansion for marketing access and auction market development	0.10	4.	0.42
Total Score			2.10
Weakness			
1. Production facilities are not sufficient.	0.10	2	0.20
2. Farmers' abilities and knowledge regarding mango handling and technological developments are still lacking	0.10	1	0.10
3. Product diversification is less attractive and prices are less competitive.	0.09	1	0.09
4. Institutional farmers are less active and selective in providing capital.	0.08	2	0.17
5. Auction market facilities are still very lacking	0.11	1	0.11
Total Score			0.66
Grand Total			2.76

1. Grand Strategy Matrix Analysis

The score results obtained from table 3 (IFE) and table 4 (EFE) are used to determine the quadrant position with a grand strategy matrix analysis which later the results from the quadrant position are used to determine alternative strategies in Karanganyar Regency with the SWOT Matrix. The results of the IFE score are used for the coordinates of the horizontal point (X) and the EFE score as the coordinates of the vertical axis (Y). The value at the coordinates of the horizontal axis (X) is calculated by subtracting the internal factors of strengths and weaknesses, namely $(2.10 - 0.66) = 1.44$. While the value on the vertical axis coordinates (Y), the reduction of the external factor of opportunity with the threat factor, namely $(1.81 - 0.63) = 1.18$. Based on the calculation of the IFE and EFE scores, the quadrant I position (1.44 ; 1.18) was obtained, where the position was strategic for S-O.

Table 6. Strategy Coordinates

Internal Factor	Coordinate X	External Factor	Coordinate Y
Strengths = 2.10	1.44	Opportunity = 1.81	1.18
Weakness = 0.66		Threat = 0.63	

Source: Primary Data

The results of the study indicate that the position in quadrant I is an alternative to the S-O strategy. Quadrant I (S-O) position has a strategic position (excellent position) (David et al, 2017). Several strategies are appropriate to be applied to the I S-O quadrant, namely by concentrating on the market and products owned (Wardhono et al., 2021). Strategies that concentrate on markets and products that can be applied according to expert respondents/experts on the results of the SWOT Matrix are: 1) Branding Karanganyar Regency as Mango City, 2) Expanding Market Reach, 3) Attracting Investors to Invest in Mango Processing, 4) Utilization of Off-season Technology to Maintain the Continuity of Mango Production.

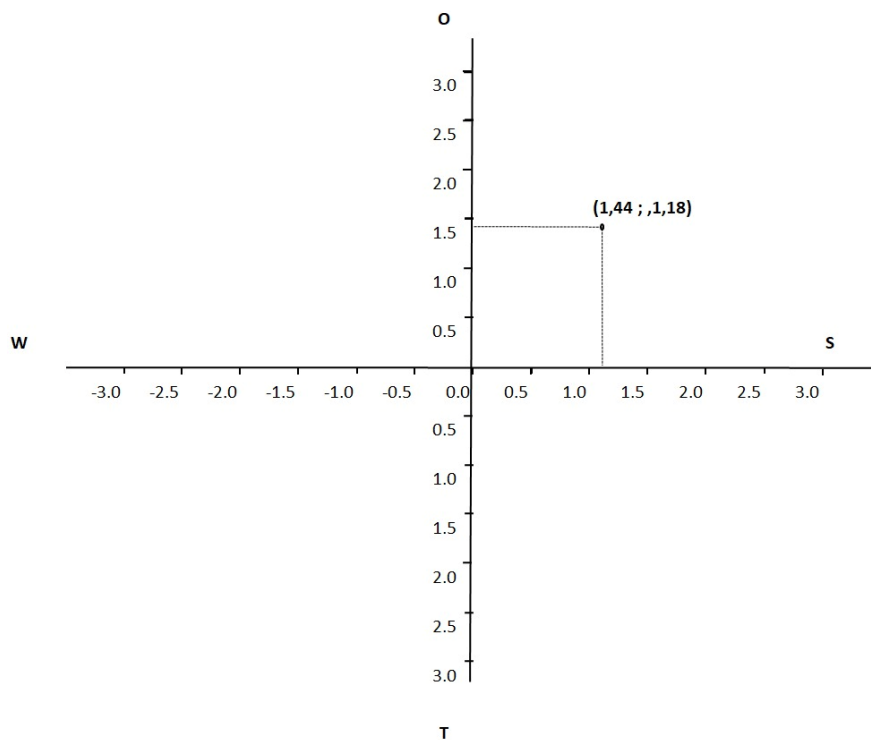


Figure 1. Quadrant position grand strategy matrix

2. SWOT Analysis

The SWOT matrix is a tool used to determine alternative strategies that are formed with 4 types of strategies, namely SO, ST, WO, and WT (Pinem et al, 2021). The formation of the SWOT

Matrix begins with determining the Internal Factor Evaluation (IFE) and External Factor Evaluation (EFE) (Tenriawaru et al, 2020). The internal and external factors in table 4 and table 5 are used to determine alternative strategies with the SWOT Matrix. The results of the S-O SWOT Matrix can be seen in table 7:

Table 7. Matrix of SWOT Analysis of Mango Agribusiness in Karanganyar Regency

IFAS	Strengths
EFAS	<ol style="list-style-type: none"> 1. Availability of production facilities. production equipment and machinery. fertilizer. pesticide. seeds and seed availability. 2. Competitive price and quality of mango 3. With product diversification, it can expand market segmentation because consumer tastes vary 4. Capital assistance by government institutions that are useful for the development of farming 5. Information expansion for marketing access and auction market development
Opportunity	Strategy S-O
<ol style="list-style-type: none"> 1. High market demand for mangoes. 2. The climate and soil in Karanganyar are suitable for mango cultivation. 3. The existence of technology for post-harvest management. 4. Management of mango into another product. 5. Buyers have easy access to mangoes. 	<ol style="list-style-type: none"> 1. Branding of Karanganyar Regency as Mango City (S1. S2. S4. S5. O1. O2. O3. O4) 2. Expanding Market Reach (S2. S3. S4. S5. O1. O2. O5) 3. Attracting Investors to invest in Mango Processing (S2.S3.S4.O2.O3.O4) 4. Utilization of Off-season Technology to Maintain Continuity of Mango Production (S1. S4. O1. O2. O3)

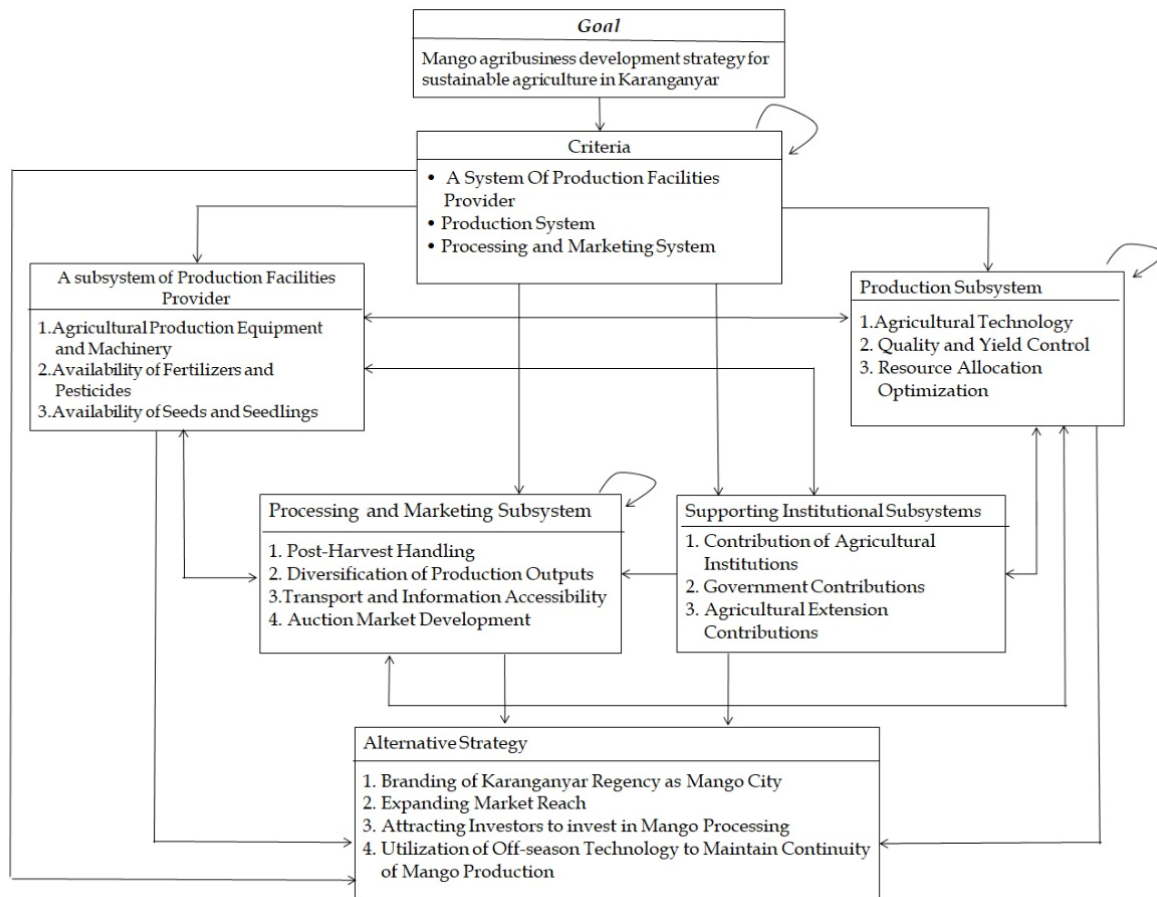
The results showed the coordinate position in quadrant I (one). Mango agribusiness in Karanganyar Regency has the advantage to launch diversification of its products into growing and promising business areas. Quadrant I (S-O) has a high level of Cash Flow. In quadrant I position, mango agribusiness in Karanganyar Regency has a strong factor that becomes a reference for offensive strategies by taking advantage of opportunities that exist in external factors (Haekal, 2022).

ANP (Analytic Network Process). According to Saaty in Rusydiana et al (2013), ANP is a multi-attribute decision-making approach based on reasons, knowledge, and experience of experts in their field. ANP is a comprehensive technique that allows including all relevant clusters, both tangible and intangible. ANP is a measurement theory that is generally applied to the dominance of influence among stakeholders or alternatives to clusters.

According to Alfian (2013), One of the advantages of using the ANP model in the decision-making process is that it can accommodate linkages between clusters and decision-making nodes in the problems at hand. Based on the nodes that have been identified, found linkages at some of these nodes. This relationship can be divided into 2, namely inner dependence and outer dependence (Mu et al., 2020) Inner dependence is the relationship that occurs between nodes in the same cluster while outer dependence is the relationship that occurs between nodes in different clusters. Information on the relationship between the nodes contained in this study was obtained from the results of interviews with expert informants/decision makers.

The agribusiness subsystem was chosen as a cluster because of its wide scope and a great influence on the development of mango agribusiness in Karanganyar Regency (Mrówczyńska-Kamińska & Bajan, 2019). The agribusiness subsystem is an agribusiness activity that starts from upstream to downstream (Ivanova et al, 2020). The ANP framework structure is complete with clusters, and nodes. Each cluster identified the relationship between clusters. This relationship can be divided into 2, namely inner dependence and outer dependence. Inner dependence is the relationship that occurs between clusters on the same node while outer dependence is the

relationship that occurs between clusters that leads to various nodes in different clusters (Saaty and Vargas, 2006). After identifying the linkages, pairwise comparison is carried out on the Super Decision application. The data is obtained from filling out questionnaires by expert informants which will be processed through the Super Decision application for the initial step of determining priorities.



Source: processed data 2022

Figure 2. Analytics Network Process Flow and Theoretical Framework

Supermatrix is used in ANP because of the relationship between clusters and between nodes in the ANP network. According to Saaty in Aragonés-Beltrán et al. (2017), there are 3 types of supermatrix in the Analytic Network Process, namely unweighted supermatrix, weighted supermatrix, and limit supermatrix. Manual calculation of ANP is done with 3 types of supermatrix, for Super Decision limit supermatrix can be directly obtained by clicking Computations then Priorities. The data that appears in the priorities is Normalized by cluster and Limiting and later the data will still be processed with the Geometric mean. According to Santoso (2016), the geometric mean is often used to calculate the average change from data over time. The geometric mean is a conservative average measure, because it is not too affected by extreme values. The geometric mean data is the final result data to determine the ranking priority for each cluster and node. The results of data processing can be seen in table 8.

Then do the Rater Agreement Analysis. Synthesis in calculating the method with rater agreement, which is a measure that shows the level of conformity (approval) of expert informants (R1-Rn) to a problem in a cluster. The tool used to measure rater agreement is Kendall's Coefficient of Concordance. The output to be achieved statistically will result in an assessment from experts and practitioners related to subsystems and alternatives. This is supported by a rater agreement

with the highest value Kendall's Coefficient of Concordance $W=1$ ($W=100\%$), indicating a perfect level of understanding from each expert in determining management priorities (Ascarya, 2011).

The priority results of each aspect are presented in the table. In the subsystem aspect, the top priority for the development of mango agribusiness for sustainable agriculture is the Supporting Institutional Subsystem. Furthermore, on the node of the cluster; A subsystem of Production Facilities Provider, the priority is the Availability of Fertilizers and Pesticides. For Production Subsystems, the best priority node is agricultural technology. The priority for the Processing and Marketing Subsystem is the Diversification of Production Outputs. Supporting Institutional Subsystems that play the most role are Agricultural Extension Contributions. Priority Alternative strategies obtained by in-depth interviews with experts and processed through the superdecision application are Expanding Market Reach.

Table 8. Analytic Network Process Results

No	Aspects	Normalized by Cluster	Limiting	Ranking	Rater Agreement (W)
Criteria					
1	A system of Production Facilities Provider	0.262592	0.068282	2	
2	Production system	0.199314	0.051827	4	0.91
3	Processing and Marketing system	0.251981	0.065524	3	
4	Supporting Institutional systems	0.285787	0.074314	1	
A subsystem of Production Facilities Provider					
1	Agricultural Production Equipment and Machinery	0.264659	0.030401	3	
2	Availability of Fertilizers and Pesticides	0.375548	0.043149	1	0.33
3	Availability of Seeds and Seedlings	0.274174	0.031495	2	
Production Subsystem					
1	Agricultural Technology	0.376159	0.061622	1	
2	Quality and Yield Control	0.363529	0.059552	2	0.44
3	Resource Allocation Optimization	0.235082	0.038510	3	
Processing and Marketing Subsystem					
1	Post-Harvest Handling	0.262309	0.045457	2	
2	Diversification of Production Outputs	0.285603	0.049493	1	0.20
3	Transport and Information Accessibility	0.225318	0.039046	3	
4	Auction Market Development	0.167598	0.029043	4	
Supporting Institutional Subsystems					
1	Contribution of Agricultural Institutions	0.321791	0.050502	2	
2	Government Contributions	0.258685	0.040597	3	0.78
3	Agricultural Extension Contributions	0.406258	0.063757	1	
Alternative Strategy					
1	Branding of Karanganyar Regency as Mango City	0.144703	0.018814	4	
2	Expanding Market Reach	0.393030	0.051100	1	
3	Attracting Investors to invest in Mango Processing	0.153385	0.019942	3	0.85
4	Utilization of Off-season Technology to Maintain Continuity of Mango Production	0.297803	0.038719	2	

Source: processed data 2022

Priorities Criteria. Supporting Institutional Systems (0.285787) ranked first in the system criteria. Tedjaningsih et al (2018) state institutional is a supporting subsystem for the procurement of production facilities, farming, processing of products, and marketing. So that the existence of farmer groups as part of agricultural institutions will of course greatly help farmers in utilizing the assistance provided by the government, because if farmers continue to survive with the old pattern, namely by relying on individual systems, it will be difficult to be able to access all kinds of agricultural facilities provided by the government (Khatri-Chhetri et al, 2019). Through the role of institutions, the process of disbursing aid funds from other financial institutions and institutions

can be carried out more easily because of the scale of the group (Sinaini and Iwe, 2020). And the bank also has confidence because the lending system is carried out through an institutional role.

A subsystem of Production Facilities Provider. Availability of Fertilizers and Pesticides (0.375548) is the most prioritized in the subsystem of production facilities provider. Fertilizer and pesticide subsidies are intended to ease the burden on farmers, as well as a process of transferring technology to farmers to use superior seeds and balanced fertilization at affordable prices, so that production and productivity increase (Mather and Jayne, 2018). Fertilization is important to do when the plant is not yet productive and after the age of the plant has entered the productive age, namely after harvesting and /or after heavy lifting (Liu & Wu, 2022).

Currently, farmers in Karanganyar Regency have never received fertilizer and pesticide subsidies, this is because mangoes are not a strategic staple. The horticultural subsector that received fertilizer subsidies in 2022 consisted of chili, shallots, and garlic. This is an obstacle for mango farmers in Karanganyar Regency; because they work on their production facilities using personal funds so they cannot maximize their production. The availability of agricultural production facilities in the form of seeds, fertilizers, pesticides, and also capital is a factor that influences farmers' decisions in applying off-season technology.

Production Subsystem. Agricultural technology is the most prioritized in the production subsystem (0.376159). Mango farmers in Karanganyar Regency do not yet have the technology to develop production. Mango fruit has a high potential if it is to be developed. However, there is a need for time and energy efficiency to support productivity to be more efficient. This efficiency is in the sense of developing the company with technological investments, in the form of mechanical equipment. Using mechanical equipment, efficiency can be easily achieved. Isham in Chen (2020), proposed that, if there were more people in a farmers' social network who adopted a technology, farmers would be more willing to adopt themselves. Mango production needs to be supported by the application of appropriate technology by the needs of farmers. The availability of appropriate technologies is an important part of encouraging the interest of farmers to apply them at the required level. The application of technology is also necessary to optimize the quality of products produced by farmers (Brecht et al., 2017).

The use of information technology needs to be encouraged to align Karanganyar Regency mango with world mango which has built its competitiveness first. The potential for the application of smart farming in Karanganyar Regency mango is very open and needs to be developed massively to increase. According to Lestari (2020), smart agriculture is a cutting-edge agricultural system supported by today's technology to support the productivity of agricultural products to be maximized, this system aims to regulate and predict crop yields and problems faced by farmers.

Processing and Marketing Subsystem. Diversification of Production Outputs (0.285603) is the most prioritized in the processing and marketing subsystem. Diversification is a business that is often taken by rural farmers. The situation that supports the implementation of this strategy is that if there are no more growth opportunities for mango products or market share begins to decline, consumers are unstable, and the impact on the rise or fall of sales or profits, and farmers optimize their land using such diversification. Processing new products by diversifying them is very important for the survival of farmers and companies, so companies or farmers need to diversify products to maintain income balance (He et al., 2022). Diversification of new products has a large role to play in economic growth and is often an overall contributor to the business being pursued. Cravens (1996) states the successful diversification of production output is closely related to the attractiveness of the industry (market), favorable market entry costs, and opportunities to increase competitive advantage.

Grant (1999) argues that, if a company that diversifies products, allocates resources, monitors and supervises operational managers more effectively compared to market systems in the long run, a diversified company or map will show greater profits and faster growth compared to specialized companies. Based on the description above, product diversification can be used as an

alternative for companies and farmers to be able to increase their sales, and expand market reach and companies need to hold planned and sustainable product diversification because of the positive influence between the introduction of new products and increased sales (Khamidi, 2013).

Supporting Institutional Subsystems. Agricultural Extension Contributions (0.321791) is the most prioritized in the supporting institutional subsystems. Low human resources in the agricultural sector are a special concern for extension workers in building awareness of better farming agricultural extension is a process of education and learning with a non-formal education system to organize and change the behavior of farmers to have better knowledge, skills, and attitudes in accessing markets, technology and, capital so that decision-making from various alternative knowledge with increasing self-capacity to solve problems to improve their welfare. Agricultural extension is an important key to prospering the people who work in the agricultural sector in rural areas. Agricultural extension is an important key to change that directly relates to farmers (Wang et al., 2021).

Alternative Strategy. An alternative strategy that can be used from a SWOT matrix defined with a grand strategy matrix is at quadrant I (S-O). There are 4 alternatives that are in the position of quadrant I, can be seen in the table 8 above. Based on calculations with the ANP method the main priority of the strategy is expanding market reach (0.393030). As a result, the most prioritized alternative strategy is to expand the market reach.

Expanding Market Reach. Marketing is one of the very important elements to support success in running a farming business so marketing expansion needs to be carried out (Umariyah et al., 2022). By implementing a good marketing strategy, farming will be able to produce income that prospers farmers. Marketing strategy is key to achieving competitive advantage and success in a farming business. The development of mango agribusiness has been hampered due to low marketing channel and efficiency, the unintegrated mango supply chain from upstream to downstream (Lee et al, 2020).

The problem of marketing mango commodities includes how to translate demand from consumers to producers and inform products produced by producers to consumers, distribution of agricultural products and marketing services from producers to consumers, and harmonizing marketing processes due to the dynamics of market demand and consumer preferences (Sudiyono, 2001). Open marketing implies developing a network of strategic partnerships with companies with complementary skills. The objective is to tap into the knowledge and expertise required for success in the current turbulent environment, while keeping emerging insights proprietary. By linking organizational capabilities with external partners, enduring relationships with customers, channel members and suppliers can be developed (Hoekstra and Leeflang 2022). According to Tuhpawana Sendjaja (2000), to face the market of agribusiness players needs to be equipped with a marketing concept that is developing rapidly by the demands of competition. As a business concept that can provide continuous satisfaction, it is not a momentary satisfaction for the three most interested parties, namely customers, employees, and shareholders.

Three strategies can be implemented to expand the market, namely 1) market breakthrough (penetration), 2) market development (expansion), and 3) product development. The strategy of 1) market breakthrough (penetration) is used to increase the market share of products that are currently owned by increasing the number of buyers in the same segment, increasing the frequency of purchases, and increasing the number of purchases. 2) The company's market development (expansion) is to focus on finding new markets whose needs may be met by the company's current products. 3) Expansion is also related to product development (diversification). The results of the diversification of processed mangoes such as chips, fruit juice drinks, and sweets can be distributed to souvenir shops in the local area. From the analysis conducted by Wiedjarnarko et al (2015), having an official distributor for each province is an alternative strategy that aims at the long term, with this strategy the company will make contact with the distributor chosen so that it can help the distribution of the company's products periodically.

CONCLUSION

Based on the results of research and analysis that has been done. then the following conclusions can be drawn:

1. Internal factors (strengths and opportunities) and external (weaknesses and threats) of mango agribusiness development in Karanganyar Regency are as follows:

- a. Strength: the availability of sufficient production facilities. competitive price and quality of mango. product. financial assistance by institutions. and expand information for marketing access
 - b. Weaknesses: inadequate production facilities. the ability and knowledge of farmers are lacking. product diversification is less attractive. farmer institutions are less active. auction market facilities are still very lacking.
 - c. Opportunity: High market demand for mango fruit. The climate and soil are suitable for mango cultivation. technology for post-harvest management. management of mangoes into other products. buyers have easy access to get mango.
 - d. Threats: pest attacks and weather. Mango is an annual plant. requires capital and education. mango prices fluctuate and there is no guarantee of price. farmers' profits are not optimal due to less extensive access to buyers.
2. Alternative strategies for developing mango agribusiness in Karanganyar Regency are as follows:
 - a. Branding of Karanganyar Regency as Mango.
 - b. Expanding Market Reach.
 - c. Attracting Investors to invest in Mango Processing.
 - d. Utilizing Off-season Technology to Maintain Continuity of Mango Production.
 3. The priority strategy based on the Analytic Network Process (ANP) method is expanding market reach (0,393030).

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